

### **What is a Combustion Source?**

A combustion source is a unit that burns fuels that are in gaseous (natural gas), liquid (fuel oil) or solid (coal or wood) form. An industrial or commercial size combustion source is usually used to create heat or steam but some may actually generate electricity. Some examples of combustion sources: boilers, furnaces, space heaters, emergency or back-up generators, or incinerators.

### **Why Should I be Concerned About Combustion Sources?**

Combustion sources will emit criteria pollutants: particulate matter (PM), nitrogen oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>2</sub>), carbon monoxide (CO), and volatile organic compounds (VOCs). Depending on the type of fuel burned, different hazardous air pollutants may also be emitted.

### **Combustion Sources and Construction Permits**

Are you considering installing a boiler or furnace to heat your building or make process steam? Do you have plans to update your existing boiler or furnace (possibly to increase capacity or improve performance)? If so, you may be required to file an application for an air pollution construction permit with the Wisconsin Department of Natural Resources (DNR).

### **Exemptions from Construction Permits**

Some small boilers and furnaces may be exempt from the requirement to apply for a construction permit. If the unit you want to install or modify (or if multiple units, each one) has a maximum heat input capacity less than one of these, it would be exempt:

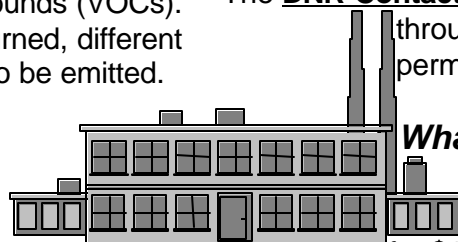
- ✓ 1 million BTU (mmBTU) per hour of coal, coke or solid fuel;
- ✓ 5 mmBTU per hour of wood, wood combined with liquid or gaseous fuel, residual or crude fuel oil;

- ✓ 10 mmBTU per hour of #2 or diesel fuel oil;
- ✓ 25 mmBTU per hour of natural gas or propane.

### **How Do I Apply for a Construction Permit?**

Contact the DNR or Small Business Clean Air Assistance Program (SBCAAP) to get the application packet containing the **Expanding Industry in Wisconsin** instructions and the application forms. If you have questions about how to complete the forms you can contact DNR or the SBCAAP to help arrange a pre-application meeting. Once you have completed the application, two copies should be submitted to the nearest DNR office or service center.

The **DNR Contacts** fact sheet lists the offices throughout the state as well as permit contacts in your area.



### **What Will the Application Cost?**

You must enclose a check for \$1,350.00, payable to the Department of Natural Resources, when you submit the application. Other costs associated with the construction permit review process will vary depending on which air requirements apply to your proposed project. Some additional costs include:

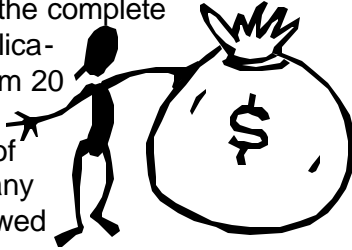
- \$2300 Minor Source review fee;
- \$2300 for stack test (may not be required);
- \$700 air quality analysis;
- \$400 additional dollars will be charged for each emission source, for two or more units.
- \$2650 fee for expedited review. (This speeds up the review of your application.)

The application fee will be returned by DNR if the project does not need a construction permit or it will be applied to your final fee if the project does need a permit. If a permit is not required, you may then begin construction. If a permit is required, you must wait until a permit

is issued by DNR to begin construction. There is always a possibility that DNR will deny your permit, if you cannot meet all the requirements that apply, so you would be in trouble if you've done anything to start on your construction before receiving a permit.

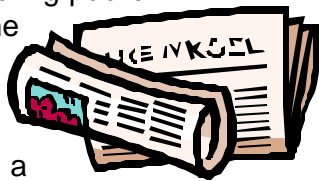
### ***What Are the Permit Review Steps?***

First, the DNR reviews the complete construction permit application, which can take from 20 to 60 days or more depending on the size of the project and how many permits are being reviewed by DNR. The DNR then prepares a preliminary decision on whether the application is approved or denied and publishes a notice in your local paper. The notice tells the public they have 30 days from the date that paper was published to comment on the proposed project.



If the public shows significant interest in the proposed project or specifically requests one, the DNR will schedule a public hearing within 60 days after the end of the public comment period. Then DNR will issue or deny the construction permit within 60 days after the close of the public hearing. Note that this means a public hearing could add up to 120 days to the process.

If there is minimal interest during public comment, DNR can issue the permit immediately after the 30 days is up. Once issued, the construction permit is effective for 18 months, with a possibility for a one time 18-month extension upon request.



### ***Calculating Emissions for the Permit Application***

#### **Boiler Rating**

First, you will need to know the rating of your combustion unit (assume it's a boiler from now on). The rating is also known as the heat input to the boiler. It is often expressed in terms of units of energy input to the boiler for each hour of operation, such as British Thermal Units (BTU), boiler horsepower or pounds of steam per hour. You can get the rating from the "boilerplate" on the boiler or contact the

boiler's manufacturer. There may be different ratings for different fuels.

Whichever units you find the rating in, you'll need to convert to million BTU (mmBTU) for the calculations. Conversions can be calculated by:

a) 1 boiler horsepower (BHP) = 0.05 mmBTU/hr

b) 1 pound of steam/hr = 0.0017 mmBTU/hr

**For example:**

$$200 \text{ BHP} \times 0.05 \text{ mmBTU/hr} / 1 \text{ BHP} \\ = 10 \text{ mmBTU/hr}$$

OR

$$5800 \text{ lb steam/hr} \times 0.0017 \text{ mmBTU/lb steam} \\ = 9.9 \text{ mmBTU/hr}$$

#### **Fuel Heating Value**

Next, you will need to know the heating value or heat content of the fuels you use, including any back up fuel(s). This value is usually measured in units of energy per volume. For natural gas the volume is measured in standard cubic feet (SCF). Usually the volume used is large enough that it's measured in million SCF or  $10^6$  SCF (a.k.a. SCF6). Fuel oil would be measured in thousand gallons or  $10^3$  gallons (a.k.a. GAL3).

If you use fuel oil, you will also need to know the sulfur content in the fuel in units of percent by weight.

**For example:**

A value of 0.5 percent S by weight would be determined from a calculation:

$$0.005 \text{ pounds sulfur per pound fuel} \times 100 = 0.5 \%$$

The heating value and sulfur content of your fuel should be available from your fuel supplier and you should be able to request them in the appropriate units. So you wouldn't usually be expected to need the above calculation, just those for MTE shown below.

#### **Fuel Throughput**

The third thing you need to determine is the maximum throughput of your fuels. To figure out your throughput you need to use the boiler rating and the

heating value. We'll use a 9.0-mmBTU/hr rating for the boiler, a heating value of 1050 mmBTU/SCF6 for natural gas and 140 mmBTU/GAL3 for the backup #2 fuel oil. The throughput is calculated by dividing BOILER RATING by HEATING VALUE.

Natural gas = 9 mmBTU/hr / 1050 mmBTU/SCF6 = 0.0086 SCF6/hr.

#2 fuel oil = 9 mmBTU/hr / 140 mmBTU/GAL3 = 0.064 GAL3/hr.

### **Maximum Theoretical Emissions**

Finally, you need to calculate your Maximum Theoretical Emissions (MTE). MTE is defined as the amount of air pollution you would emit into the air if you operated your equipment at its maximum production capacity for 24 hours a day, 365 days a year without any control device. When you have multiple materials used at a process, you must take the worst case of all materials to determine the MTE.

To calculate your MTE you need the emission factors for each of the types of fuels you burn. Emission factors can be found: (1) in an EPA document called AP-42; (2) through your trade association; or (3) from your fuel supplier. MTE rates are calculated by multiplying THROUGHPUT by the EMISSION FACTOR.

#### **Emission Factors from AP-42:**

Pollutant	Natural Gas lb/SCF6	#2 Fuel Oil lb/GAL3
PM	12	2
NO <sub>x</sub>	100	20
SO <sub>2</sub>	0.6	142S
CO	21	5
VOC	5.3	0.34

The S in the SO<sub>2</sub> emission factor is the percent sulfur by weight. If we assume they're using a low sulfur fuel, where S is 0.05% by weight, the final emission factor is:

$$142 \times 0.05 = 7.1 \text{ lb S/GAL3}$$

Natural gas

$$\text{SO}_2 = 0.6 \text{ lb/SCF6} \times 0.0086 \text{ SCF6/hr} = 0.005 \text{ lb/hr}$$

#2 Fuel Oil

$$\text{SO}_2 = 7.1 \text{ lb/GAL3} \times 0.064 \text{ GAL3/hr} = 0.45 \text{ lb/hr}$$

So the worst case SO<sub>2</sub> MTE rate you would include in the application is for the #2 fuel oil at 0.45 lb/hr. Comparing this with the MTE general exemption levels, this is less than the 9.0 lb/hr level for SO<sub>2</sub>.

You would continue to do this calculation for each pollutant, determining which fuel has the higher MTE of each pollutant and including that higher rate for the pollutant in the application.



### ***Contacts for More Information or Assistance.***

The Small Business Clean Air Assistance Program helps smaller businesses understand and comply with the Clean Air Act regulations. Contact one of the program's Clean Air Specialists for more assistance: Renée Lesjak Bashel at 608/264-6153 or Tom Coogan at 608/267-9214.



For further information on the calculations or application process contact your DNR Regional or Service Center office shown on the **DNR Contact Fact Sheet** or the DNR's Central office at 608/266-6876.